U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

SECTION 7.5 INFORMATION SYSTEMS IMPORTANT TO SAFETY

REVIEW RESPONSIBILITIES

Primary - Instrumentation and Control Systems Branch (ICSB)

Secondary - None

I. AREAS OF REVIEW

The areas reviewed in this section of the applicant's safety analysis report (SAR) include those which provide information for manually initiated and manually controlled safety functions, to indicate that plant safety functions are being accomplished, and to provide information from which appropriate actions can be taken to mitigate the consequences of anticipated operational occurrences and accidents. During normal operation these systems provide information on the bypassed or inoperable status of safety systems. The safety parameter display system, information systems associated with the emergency response facilities and nuclear data link are included in the review. Radiation monitoring systems, fire detection systems, and the information systems for environs conditions during and following an accident are addressed in the review of other sections of the SAR.

The objectives of the review are to confirm that the information systems important to safety satisfy the requirements of the acceptance criteria and guidelines applicable to these systems and that they will provide the information to assure plant safety during all plant conditions for which they are required. The review verifies that all functional performance requirements of the information systems important to safety satisfy the design bases for safety system functions consistent with the safety analysis described in Chapter 15 of the SAR.

The review performed for a construction permit application may be based on preliminary designs and the depth of information need only be sufficient to provide reasonable assurance that the final design will conform to the design bases and applicable criteria with an adequate margin for safety. The review performed for an operating license (OL) application is based upon detailed design information that confirms that the final design conforms to the design bases and applicable criteria. The depth of the review for an OL application should be sufficient to conclude that the requirements of the Commission regulations have

been satisfied. The depth of the review for the balance of the criteria should be sufficient to conclude that the systems conform with the guidelines to the extent required to support the findings of conformance to the regulations.

In addition, ICSB will coordinate with other branches that interface with the overall review of the information systems important to safety, including the following:

The Equipment Qualification Branch (EQB) assures that the instrumentation which requires seismic and/or environmental qualifications is included in the qualification programs as part of its primary review responsibility for SRP Sections 3.10 and 3.11.

The Human Factors Evaluation Branch (HFEB) confirms the adequacy of human factors engineering of the control room and emergency response facilities as part of its primary review responsibility for SRP Chapter 18.

For those areas of review identified above as being reviewed as part of the primary review responsibility of other branches, the acceptance criteria necessary for the review and their methods of application are contained in the referenced SRP section of the corresponding primary branch.

II. ACCEPTANCE CRITERIA

The acceptance criteria and guidelines applicable to the information systems important to safety are identified in SRP Section 7.1. The review of Section 7.1 of the SAR confirms that the appropriate acceptance criteria and guidelines have been identified as applicable for these systems. The review of the information systems important to safety in this section of the SAR confirms that these systems conform to the requirements of the acceptance criteria and guidelines. The branch technical positions are used when a particular design problem and an acceptable solution have been identified.

The acceptance criteria applicable to the the information systems important to safety are:

1. General Design Criterion 2, "Design Basis for Protection Against Natural Phenomena."

2. General Design Criterion 4, "Environmental and Missile Design Basis."

General Design Criteria 2 and 4 are applicable to variables which are classified as Category 1 and 2 in Regulatory Guide 1.97.

3. General Design Criterion 13, "Instrumentation and Control."

4. General Design Criterion 19, "Control Room."

Regulatory Guides, Branch Technical Positions and industry standards that provide information, recommendations and guidance and in general describe a basis acceptable to the staff that may be used to implement the requirements of the Commission regulations identified above are given in SRP Section 7.1, Table 7-1 (Ref. 1) and SRP Appendix 7-A (Ref. 2). In addition, Task Action Plan items are also implemented to meet the regulations as identified in SRP Section 7.1, Table 7-2 (Ref. 3).

III. REVIEW PROCEDURES

This subsection describes the general procedures to be followed in reviewing the information systems important to safety. The bases for the evaluation of conformance to the requirements of the acceptance criteria and guidelines may be based upon referenced approved designs. The category of referenced approved designs include topical reports, standard design approvals, and designs of systems which have been previously reviewed and approved by the Commission. If any aspect of a design is not identical to that which is referenced, an evaluation must be made to address the adequacy of the differences and the conclusions included in the safety evaluation report.

Review guidance for conformance to the GDC are provided in Appendix A of SRP Section 7.1 (Ref. 4). The review guidance includes references to the guidelines in regulatory guides and industry codes and standards where applicable. An audit review of the information systems important to safety should be made to confirm that the systems conform to the guidelines to support the conclusions of conformance to the regulations.

The information systems important to safety are reviewed as follows:

1. The information systems important to safety are reviewed to confirm that they conform to the requirements of the GDC identified in the acceptance criteria in subsection II of this SRP section.

2. The guidelines for the instrumentation to assess plant conditions during and following an accident are provided in Regulatory Guide (RG) 1.97. The review should confirm that the information systems important to safety are designed and implemented in accordance to the guidelines of RG 1.97. The information systems should cover appropriate variables, consistent with the assumptions for accident analyses and with the information needs of the operators in transient and accident conditions.

3. The guidelines for the instrumentation for bypassed and inoperable status indication for safety systems are provided in RG 1.47. The review should confirm that the information systems important to safety are designed and implemented in accordance to the guidelines of RG 1.47.

4. The guidelines for the physical independence of electrical systems are provided in RG 1.75. The review should confirm that the variables which are classified as Category I in RG 1.97 are designed and implemented in accordance to the guidelines of RG 1.75.

5. The guidelines for instrument spans and set points are provided in RG 1.105. The review should confirm that the information systems important to safety are designed and implemented in accordance to the guidelines of RG 1.105. The accuracy and range of indicating instrumentation should be consistent with the assumptions of the accident analyses. Any exceptions to these requirements will be referred to the appropriate branch for resolution on an individual case basis.

6. The guidelines for instrument sensing lines are provided in RG 1.151. The review should confirm that the environmental monitoring system is designed and implemented in accordance to the guidelines of RG 1.151

position 5. Meeting this position will assure that safety related instrument sensing lines are protected from the effects of freezing due to extreme cold weather.

7. The safety parameter display system (SPDS), the information systems associated with these emergency response facilities, and nuclear data link are reviewed to confirm that they conform to the guidelines in NUREG-0696, "Functional Criteria for Emergency Response Facilities" (Ref. 5).

An important part of the review is the engineering drawing review at the OL stage. The drawing review should confirm that the design and layout meet the applicable criteria listed under subsection II.

A site visit should be performed before the evaluation findings are written for an OL. The site visit should include an audit verification that the design and layout criteria reviewed during the drawing review are implemented. An outline of topics for a site visit is provided in Appendix 7-B (Ref. 6) to SRP Chapter 7.

In certain instances, it will be the reviewer's judgment that for a specific case under review, emphasis should be placed on specific aspects of the design, while other aspects of the design need not receive the same emphasis and indepth review. Typical reasons for such a nonuniform placement of emphasis are the introduction of new design features or the utilization in the design of design features previously reviewed and found acceptable. However, in all cases, the review must be sufficient to conclude conformance to the acceptance criteria, i.e., the requirements of the Commission's regulations.

IV. EVALUATION FINDINGS

The reviewer confirms that sufficient information has been provided and the review supports conclusions of the following type, to be included in the staff's safety evaluation report:

> The information systems important to safety provide the operator with information on the status of the plant to allow manual safety actions to be performed when necessary. The scope of review included tables of system variables and component states to be indicated, functional control diagrams (CP and OL), electrical and physical layout drawings (OL), and descriptive information. The review has included the applicable acceptance criteria and guidelines and design bases, including that for indication of bypassed or inoperable safety-related systems. The review has also included the applicant's analyses of the manner in which the design of information systems conforms to the acceptance criteria and guidelines which are applicable to these systems as noted in the staff's Standard Review Plan.
>
> The staff concludes that the information systems important to safety are acceptable and meet the requirements of General Design Criteria 2, 4, 13 and 19. This conclusion is based on the following:
>
> We have conducted an audit review of these systems for conformance to guidelines of the regulatory guides and industry codes and standards applicable to these systems. In Section 7.1 of this SER we concluded that the applicant had adequately identified the guidelines applicable

to these systems. Based upon our audit review of the system design for conformance to the guidelines we find that there is reasonable assurance that systems conform fully to the guidelines applicable to these systems.

Our review has included the identification of those systems and components for the information systems which are designed to survive the effects of earthquakes, other natural phenomena, abnormal environments, and missiles. Based upon our review we conclude that the applicant has identified those systems and components consistent with the design basis for those systems. Sections 3.10 and 3.11 of this SER address the qualification programs to demonstrate the capability of these systems and components to survive these events. Therefore we find that the identification of these systems and components satisfies this aspect of GDC 2 and GDC 4.

The information systems important to safety conform to the guidelines for the instrumentation to access plant conditions during and following an accident provided in ANSI/ANS-4.5-1980, "Criteria for Accident Monitoring Functions in Light-Water-Cooled Reactors" as supplemented by Regulatory Guide (RG) 1.97. The redundant information systems conform to the guidelines for the physical independence of electrical systems provided in RG 1.75. The instrument spans and set points conform to the guidelines of Regulatory Guide 1.105. The environmental monitoring system provided to protect the safety related instrument sensing lines from freezing conforms to the guidelines of RG 1.151, position 5. The safety parameter display system, the information systems associated with the emergency response facilities and the nuclear data link conform to the guidelines in NUREG-0696, "Functional Criteria for Emergency Response Facilities."

We conclude that the information systems important to safety include appropriate variables and that their range and accuracy are consistent with the plant safety analysis. Therefore, we find that the information systems satisfy the requirements of GDC 13 for monitoring variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions. Further, we find that conformance to GDC 13 and the applicable guidelines satisfies the requirements of GDC 19 with respect to information systems provided in the control room from which actions can be taken to operate the unit safety under normal conditions and to maintain it in a safe condition under accident conditions.

The applicant has also incorporated into the system design the recommendations of Task Action Plan items [identify item number and how implemented] which we have reviewed and found acceptable.

The conclusions noted above for the information systems important to safety are applicable to all portions of the system except for the following for which acceptance is based upon prior commission review and approval as noted: [List applicable system or topics and identify references]

V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guides and NUREGs.

VI. REFERENCES

1. Standard Review Plan Section 7.1, Table 7-1, "Acceptance Criteria for Instrumentation and Control Systems Important to Safety."

2. Standard Review Plan Appendix 7-A, "Branch Technical Positions (ICSB)."

3. Standard Review Plan Section 7.1, Table 7-2, "TMI Action Plan Requirements for Instrumentation and Control Systems Important to Safety."

4. Standard Review Plan Section 7.1, Appendix A, "Acceptance Criteria and Guidelines for Instrumentation and Control Systems Important to Safety."

5. NUREG-0696, "Functional Criteria for Emergency Response Facilities."

6. Standard Review Plan Appendix 7-B, "General Agenda, Station Site Visits."